CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA

Civil Aviation Advisory Publication November 2000

This publication is only advisory. It gives the preferred method for complying with the Civil Aviation Regulations (CAR 1988).

It is not the only method, but experience has shown that if you follow this method you will comply with CAR 1988.

Always read this advice in conjunction with the appropriate regulations.

Contents ...

CAAP 89W-1(0)

Guidelines on provision of obstacle information for take-off flight planning purposes

The relevant regulations

- regulations 89I and 89W of the CAR 1988

Who this CAAP applies to

- Aerodrome operators
- Operators of aeroplanes conducting operations under CAO 20.7.1B
- persons engaged in the survey and presentation of obstacle data.

Why this publication was written

Obstacle information is provided in AIP- ERSA Runway Distances Supplement in the form of a take-off obstacle free gradient. Whilst this is normally adequate for aeroplanes with less than 5700 kg MTOW, aeroplanes operating under CAO 20.7.1B require more obstacle information to maximise take-off weight for flight planning and minimise risk of collision with obstacles. Currently, aerodromes used in international operations are required to provide Type A charts to supplement the ERSA information. Operators of aerodromes used in domestic operations are asked to liaise with aircraft operators regarding obstacle information to be provided.

The purpose of this Advisory Publication is to provide guidance on how to meet the airlines obstacle information requirements for take-off flight planning.

Status of this CAAP

This is the first issue of CAAP 89W-1.

For further information:

Contact the CASA office closest to you.

1. Gathering obstacle information

1.1 Under CAR 89X, a licensed aerodrome operator is required to notify CASA of any obstacle, i.e. any object, that penetrates or is planned to penetrate, the applicable obstacle limitation surfaces of the aerodrome, when such an occurrence cannot be avoided. CASA assesses the effect of the obstacle on aircraft operations at the aerodrome and may determine a range of measures to mitigate the adverse impact of the obstacle to aircraft safety. These measures may include operational limitations, and the provision of obstacle marking and lighting. Guidance on the publication and reporting of obstacle information is provided in the latest edition of CAAP 89O-1.

2. Circling , approach and landing phases of flight

2.1 Depending on their location, obstacles may affect the circling phase, approach and landing phase, or take-off and climb phase, or a combination of these phases of flight. For the circling phase, a new obstacle may require that the minimum altitude for circling be raised. For the approach and landing phase, a new obstacle may affect the location of the threshold, or require that the published permissible lowest descent altitude, where a decision to land or abort the landing has to be made, be raised.

2.2 For the approach and landing phase, the adverse effect of the obstacle is compensated by:

- requiring pilots to fly higher (which can affect visual acquisition of the runway and hence the landing itself);
- requiring pilots to land further down the runway (which can affect the maximum permissible landing weight of the aeroplane particularly when the runway is wet); and
- requiring pilots to visually avoid the obstacle by:
  - alerting pilots by providing the obstacle information through AIP-ERSA or NOTAM.
  - making the obstacle conspicuous through appropriate marking (for day) and lighting (for night).

3. Take-off and climb phases of flight

3.1 For the take-off and climb phase of flight, flight planning has to take into account the aeroplane performance and contingencies such as the failure during take-off of one of the engines.

3.2 The maximum permissible take-off weight of the aeroplane may be dictated by significant obstacles beyond

the runway. This is because the flight must be planned to allow the aeroplane to climb above all obstacles in the take-off climb area, and must take into account aeroplane performance if there is a failure of one engine during take-off.

3.2 Accordingly, the heavy investment involved in providing adequate runway length for the intended aeroplane operation may be wasted if the permissible take-off weight is obstacle limited.

4. Obstacle limited take-off weight

4.1 In the Runway Distances Supplement, obstacle clear take-off gradients are provided for each take-off distance available and supplementary take-off distance available. The climb gradient of the aeroplane with an engine inoperative must not be less than the obstacle gradient until all relevant obstacles have been cleared. The maximum weight at which this can be achieved is the obstacle limited take-off weight.

4.2 For large aeroplanes with retractable undercarriage, the take-off climb phase is normally divided into four segments:

(1) The first segment extends from the point at which the aeroplane first reaches 35 feet AGL (15 feet wet) until the point at which the undercarriage is fully retracted;

(2) The second segment extends from the point at which the undercarriage is fully retracted until the aeroplane reaches at least 400 feet AGL or has cleared all relevant obstacles. With high terrain, this segment may go considerably higher than the 400 ft AGL;

(3) The third segment is level flight during which the aeroplane is accelerated, flaps are retracted and the appropriate climb power is set on the operative engines. This is often called the acceleration segment;

(4) The fourth segment extends from the level off height of the third segment until the aeroplane reaches 1500 feet above the runway or some greater height if terrain demands. This is known as the final segment.

4.3 The requirement that the climb gradient, allowing for inoperative engine after decision speed V1, be no less than

the published obstacle clear gradient, can be a severe limitation, particularly for aeroplanes with high drag undercarriage.

4.4 However, if an operator is in possession of all discrete obstruction and terrain information instead of only the obstacle free take-off gradient, he or she can plan a take-off profile to achieve a greater maximum permissible take-off weight.

4.5 Currently licensed aerodrome operators are required to determine the take-off obstacle free gradient based on the critical obstacle located within the take-off climb area. In the case of code 3 or 4 runways, the area extends to 15 km from the end of the runway strip or clearway. The take-off climb area should not be confused with the take-off area which is referred to in CAO 20.7.1B as the area necessary for the aeroplane to climb and reach the relevant en-route lowest safe altitude.

5. Obstacle data – international operations

5.1 To meet Australian international obligations, operators of aerodromes used for international operations are required to prepare Type A charts which set out in graphic format, all objects over a gradient of 1.2%, termed as significant obstacles, in accordance with ICAO Annex 4. Significant obstacle data are gathered from the same take-off climb area but only out to 10 km or where no significant obstacles exist, whichever is the lesser.

5.2 Type A charts are revised periodically. In between revisions, changes to obstacle status are normally issued as discrete obstacle information.

6. Obstacle data - domestic operations

6.1 Currently, only a limited number of operators operate heavy transport aeroplanes at domestic aerodromes. RPA chapter 10 directs aerodrome operators to liaise with these operators regarding take-off obstacle data requirements. Aerodrome operators are urged to provide aircraft operators with the necessary obstacle data so that aeroplanes may be flight planned to operate from a runway with the maximum permissible take-off weight.

6.2 It is not normally necessary to go to the full extent of preparing a Type A chart to Annex 4 standard, although that is of course desirable. Simply listing all discrete obstacles, with the necessary details, should suffice.

6.3 The standard for determining the take-off obstacle free gradient requires obstacles within the take-off climb area which are above a 2% gradient to be assessed, and the greatest vertical angle with the horizontal, subtended by an obstacle within the take-off climb area, becomes the obstacle free take-off gradient. Depending on the types of aeroplane that use the aerodrome, a listing of all the obstacles above the 2% gradient may be adequate. For aeroplanes where the net climb gradient is down to 1.2%, any object above the 1.2% slope is a significant obstacle and listing of all significant obstacles may be necessary. An aerodrome operator needs to liaise with individual airline operators to ascertain their requirements. In general, for the purpose of surveying discrete obstacle data, the take-off climb area extends to a point beyond which no significant obstacles exist or to a distance of 10 km, whichever is the lesser. However some airline operators may desire obstacle data to be gathered from a greater survey distance.

7. Areas beyond the take-off climb area

7.1 Operators of some aeroplane types may require obstacle data for a take-off area extending more than 10 km from the aerodrome. These operators will need to find an alternative source of suitable obstacle data. Normally, obstacles that need to be considered at such a range would be very high compared to the aerodrome altitude and may be gleaned from topographical maps. However, if the topographical maps are unavailable or inadequate, operators may have to sponsor a special obstacle survey. For aerodromes serving international operations, ICAO recommends the preparation of a Type C chart, extending up to 45 km from the aerodrome reference point. Specifications for a Type C chart are contained in ICAO Annex 4.

8. Curved take-off path

8.1 If the maximum permissible take-off weight is limited by a distant obstacle, it may be possible to eliminate its effect by carrying out a curved take-off so that the obstacle lies outside the take-off climb area.

8.2 In this case, the operator would need to assess obstacles within the new curved take-off climb area which should be at least as wide as that associated with a straight take-off, to determine the permissible take-off weight for the aeroplane to complete the four segments of the take-off climb.

8.3 Where a curved take-off path will be beneficial, and obstacle data are available for the curved take-off climb area, that message should be included as a note in the runway distances supplement section of ERSA.

9. Maintenance of accuracy of obstacle data information

9.1 Where an arrangement has been made to provide particular aircraft operators with discrete obstacle data information, the aerodrome operator needs to establish a procedure so that changes to that information can be speedily passed on to the operators concerned. Detecting changes to the obstacle data information should be included as an integral part of the aerodrome OLS monitoring function.

10. Suggested format for presentation of take-off obstacle data

10.1 It is important that discrete obstacle data are presented in a format that can be easily understood and cannot be misinterpreted. A suggested format of how obstacle data should be presented is shown at Attachment A.

ATTACHMENT A - SUGGESTED FORMAT FOR PRESENTATION OF TAKE-OFF OBSTACLE DATA

Name of Aerodrome: …….. Date of survey or last update: …..……..

RUNWAY 05/23 Design aeroplane reference code: …….

TORA: ……. Rwy 05: TODA ……. TODA end RL:…… (elevation of the highest ground

Rwy 23: TODA ……..……. TODA end RL ……..… on the C/L of the clearway)

Survey specifications:

Take-off climb area:

- length of inner edge .....…….....
- divergence each side ….....…….....…
- final width …….....…….....……
- slope ……..…….....
- length of survey …….....

Approach area

- length of inner edge ……..…….
- divergence each side ……
- slope of 1st section …..…….....…. length ……..…
- slope of 2nd section …….....…. length ……..…
- horizontal section length .....

Runway 05 threshold

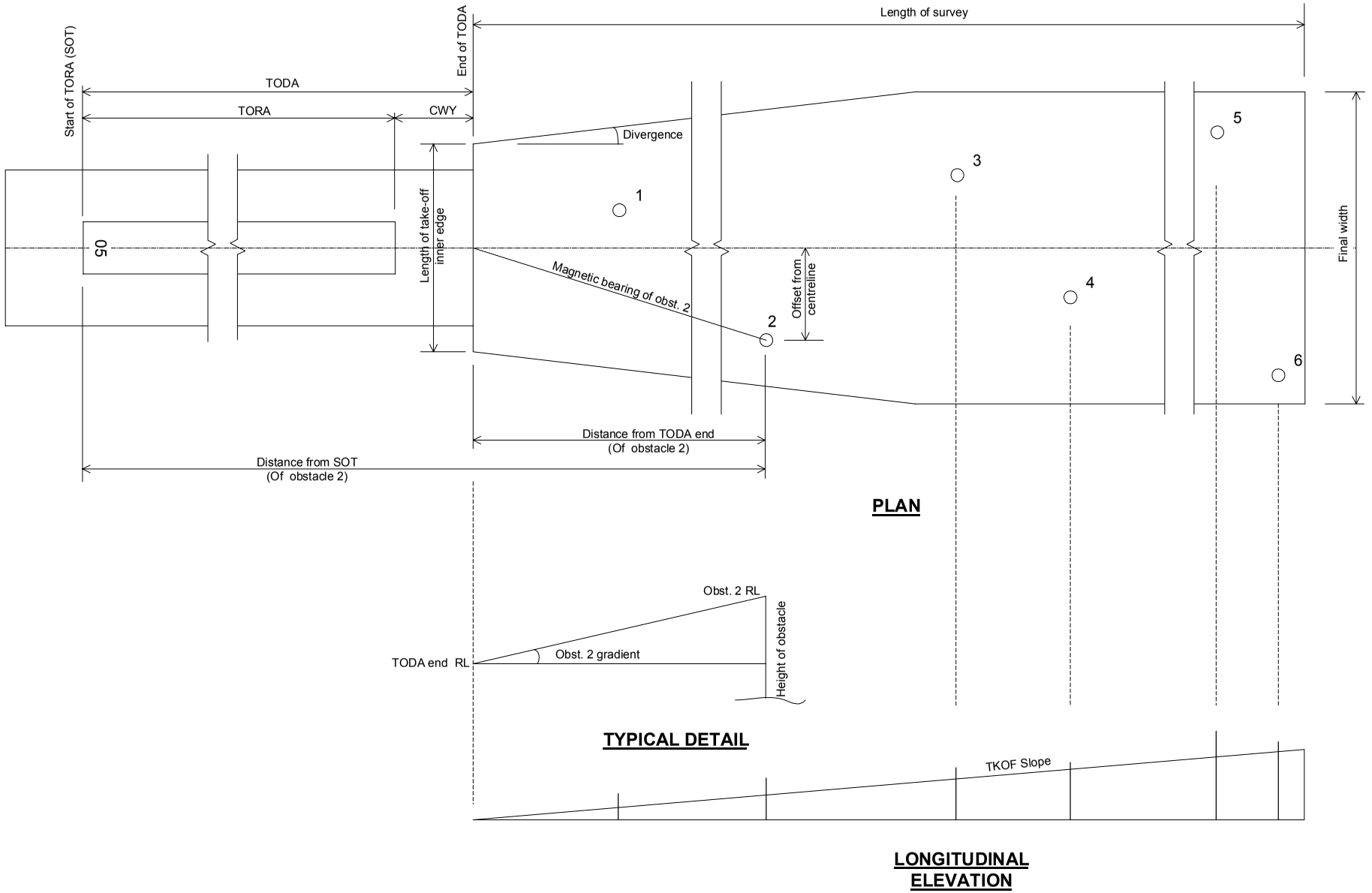
- latitude .....
- longitude .....
- elevation .....

Runway 23 threshold

- latitude .....
- longitude .....
- elevation .....

(The above information is necessary to confirm that the RWY plotted on topo map is in the correct position)

TKOF Rwy	Survey Point No.	Description	MAG BRG (in degrees & minutes)	Dist from TODA end (in metres)	Offset from C/L (in metres)	Height of Obstacle (in feet)	Obst R.L. (in feet above specified datum e.g. TODA end or AMSL	Obst Gradient (in %)	Dist from Start of TORA (in metres)	Remarks
05	1	Cypress Tree								
	2	Chimney								
23	1	Poplar Tree								
	2	Gum Tree								
	3	Tower								


Length of survey
Start of TORA (SOT)
End of TODA
TODA
TORA
CWY
Divergence
05
Length of take-off inner edge
Magnetic bearing of obst. 2
Offset from centreline
Final width
1
2
3
4
5
6
Distance from TODA end
(Of obstacle 2)
Distance from SOT
(Of obstacle 2)
PLAN
Obst. 2 RL
TODA end RL
Obst. 2 gradient
Height of obstacle
TYPICAL DETAIL
TKOF Slope
LONGITUDINAL
ELEVATION